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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,813	07/17/2007	Anand Chellappa	37929-32102	5027
86451	7590	09/28/2010	EXAMINER	
Luce, Forward, Hamilton & Scripps LLP 2050 Main Street, Suite 600 Irvine, CA 92614			HANDAL, KAITY V	
ART UNIT	PAPER NUMBER			
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/599,813	<b>Applicant(s)</b> CHELLAPPA, ANAND
	<b>Examiner</b> KAITY V. HANDAL	<b>Art Unit</b> 1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 15 July 2010.
- 2a) This action is FINAL.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-15, 17 and 19-31 is/are pending in the application.
- 4a) Of the above claim(s) 1-14 and 29-31 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 15, 17, 19-28 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/06)  
 Paper No(s)/Mail Date 7/15/2010
- 4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date: \_\_\_\_\_
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_

## DETAILED ACTION

### *Specification*

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 15, 19-20, 24 and 26-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Clawson et al. (US 6,083,425).

With respect to claim 15, Clawson teaches an apparatus comprising:  
a hydrogen reactor chamber (Fig. 1, 12) in which is disposed a plurality of steam reformation catalysts disposed therein (28 & 66 & 84) (col. 6, lines 14-45) to form a staged configuration (as illustrated), the staged configuration comprising a series of distinct zones or portions (as illustrated), each containing at least one of the plurality of

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steam reformation catalysts; and wherein said plurality of steam reformation catalysts includes a high-activity steam reformation catalyst (66), a coke-resistant steam reformation catalyst (28) and a steam reformation catalyst which promotes a water-gas shift reaction (84) (col. 6, lines 14-45) (as illustrated).

With respect to claim 19, Clawson teaches wherein said high-activity steam reformation catalyst (66) is a supported nickel-based catalyst/(transition metal oxides supported on a perforated plate (70)) (col. 4, lines 32-58).

With respect to claim 20, Clawson teaches wherein said coke-resistant steam reformation catalyst (28) is a supported doped nickel-based catalyst supported on a perforated plate (30) (col. 3, lines 63-67 and col. 4, lines 5-10).

With respect to claim 24, Clawson teaches wherein said coke- resistant steam reformation catalyst (28) is loaded at an entrance of said steam reformer, followed by said high-activity steam reformation catalyst (66) (as illustrated).

With respect to claims 26-27, Clawson teaches wherein the plurality of catalysts are powders or coatings supported on a substrate (col. 4, lines 8-10 and 54-56) where Clawson teaches that the catalyst is powder/granules supported by mesh/(perforated plates (30 and 70)).

With respect to claim 28, Clawson teaches wherein a fuel cell is in fluid communication with the hydrogen generation reactor (col. 1, lines 54-56).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 17, 21-23 are rejected under 35 U.S.C. 103(a) as obvious over Clawson et al. (US 6,083,425), as applied to claim 15 and 20 above, and further in view of Lomax, JR. et al. (US 2002/0146359).

With respect to claims 17 and 21-23, Clawson discloses all claim limitations as set forth above, and further teaches wherein said supported doped nickel-based catalyst (28) is comprised of magnesium aluminate. Clawson fails to teach wherein the nickel based catalyst (28) is comprised of calcium aluminate. However, as evidenced in Lomax, JR. that the two aluminates are functionally equivalent to one another as one can be an alternative to the other in steam reforming catalyst (P6/para.[0081]). Therefore, one skilled in the art would have chosen to replace the magnesium aluminate of Clawson with the calcium aluminate of Lomax, JR. as doing so would amount to nothing more than use of a known material for its intended use in a known environment to accomplish an entirely expected result, as evidenced by Lomax, JR; Clawson teaches wherein said supported doped nickel-based catalysts is further comprised of at least one noble metal comprising at least one of platinum, palladium, rhodium, or ruthenium or any combination thereof (col. 3, lines 61-67). Since Clawson's

modified catalyst (28) comprises the a supported doped nickel comprising calcium aluminate and noble metal as instantly claimed, then the steam reformation catalyst will perform such that it is a coke-resistant steam reformation catalyst as instantly claimed; furthermore, the coke resistant steam reformation catalyst (28) of Clawson is loaded at an entrance of said steam reformer (as illustrated).

6. Claim 25 is rejected under 35 U.S.C. 103(a) as obvious over Clawson et al. (US 6,083,425), as applied to claim 15 above, and further in view of Korotkikh et al. (US 2003/00464887)

With respect to claim 25, Clawson discloses all claim limitations as set forth above including the high activity steam reformation catalyst/(high temperature shift catalyst) (66) comprising at least one noble metal component (col. 4, lines 43-54). Clawson's teaching of the high activity steam reformation catalyst to comprise a noble metal is an alternative to the catalyst comprising a nickel oxide/(transition metal oxide) (col. 4, lines 43-54), and not in combination therewith. However, it is well known in the art to employ a high temperature water gas shift catalyst comprising a combination of a nickel oxide and a noble metal as evidenced in Korotkikh (P4/para. [0056]). Therefore, one skilled in the art would have chosen to use the combination of a nickel oxide and a noble metal in Clawson's apparatus, as an obvious alternative using the two in the alternative since doing so would amount to nothing more than the use of a known material for its intended use in a known environment to accomplish an entirely expected result, as evidenced by Korotkikh.

***Response to Arguments***

7. Specification: A new Objection is made by the Examiner as set forth above.
8. Prior Art Rejection: Applicant's arguments filed 7/15/2010 have been fully considered but they are not persuasive as follows:
  - a. On Page 10, 3<sup>rd</sup> and 5<sup>th</sup> paragraphs, Applicant argues the following:

The "high temperature shift catalyst 66" of Clawson cannot be considered a high-activity steam reformation catalyst.

As would be recognized by those having ordinary skill in the art, the catalyst of Clawson is used in one stage of a water-gas shift reaction, in which carbon monoxide reacts with water vapor to form carbon dioxide and hydrogen. This is in contrast to a steam reformation process, in which hydrocarbons react with water vapor to form carbon monoxide and hydrogen. Indeed, one or more products of steam reformation (i.e., carbon monoxide) may be the reactants of a water-gas shift reaction. The water gas shift reaction (equation 3 of the present specification) is distinctly different from steam reformation (equation 1 of the present specification).

Examiner respectfully disagrees and points out that Clawson's high activity steam reformation catalyst (66) is the same as the instantly claimed high-activity steam reformation catalyst in that it comprises a noble metal, it is a supported nickel-based catalyst - as set forth above, and is positioned downstream of a steam reformation catalyst (28); therefore, irrespective of the "name" given to the catalyst, and given the above, the modified catalyst (66) of Clawson will perform the same as the instant high activity steam reformation catalyst. Furthermore, Examiner respectfully points out that instant equations (1) & (2) are performed by using the coke resistant catalyst in combination with the high activity catalyst and the water gas shift catalyst at specific composition percentages and under selected operational conditions of temperature, pressure and residence time – see example 1 on page 19. In addition, Applicant refers to all three claimed catalysts as "steam reformation catalyst", but however the catalysts

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perform differently as instantly disclosed. The question is: how are the two catalysts, Clawson's catalyst (66) versus the instant high-activity catalyst, different based on the instant claims?

Therefore, contrary to Applicant's remarks, Clawson does teach each and every element of claim 18.

b. On Page 11, 4<sup>th</sup> paragraph, Applicant argues the following:

With regard to the "steam reforming catalyst 28" of Clawson, no mention of coke- resistance is made. The disclosure of Clawson does not disclose a catalyst having coke resistant characteristics.

Based on the above remarks, Claim 18 is not anticipated by Clawson. Clawson's catalyst 28 is a steam reformation catalyst (not a coke-resistant steam reformation catalyst as indicated by the examiner), 66 is a high temperature water gas shift catalyst (not a high activity steam reformation catalyst) and 84 is a low temperature water gas shift catalyst (not a steam reformation catalyst that promotes a water gas shift reaction).

As such, Clawson does not teach or suggest or distinguish between the definitive characteristics of a plurality of steam reforming catalysts. In particular, the characteristics of high activity steam reforming catalysts, coke resistance steam reforming catalysts and water gas promoting steam reforming catalysts are not taught. As these distinctions are not taught, it cannot be said that Clawson satisfies the limitations drawn to such distinctions.

Examiner respectfully disagrees. Clawson's catalysts as modified are the same as those instantly claimed in terms of composition and positioning. Therefore, Clawson's catalysts as modified will perform the same as instantly claimed when subjected to the same operational conditions. It is noted that Applicant's instant specification discloses in example 1 on page 19 that the coke-resistant property is a function of providing an excess of steam thereby promoting a water gas shift reaction. Therefore, the Applicant is arguing an operational condition that is not reflected in the claims and which does not lend any structural limitation to the instantly claimed apparatus as set forth by the Applicant. The question is, what does the instant catalyst comprise such that it is a coke-resistant catalyst?

c. On Page 12, 3<sup>rd</sup> paragraph, Applicant argues the following:

Additionally, the features of operation of the device of Clawson are in tension with the device claimed as disclosed in the supporting Specification.

Clawson teaches that the low temperature water gas shift reaction is conducted between 150-300C (Clawson, column 6, line 50-55), which is significantly lower than described in our specification (see Example 1 for instance).

In response to applicant's argument that the references fail to show certain

features of applicant's invention, it is noted that the features upon which applicant relies (i.e., operational condition of temperature) are not recited in the rejected claim(s).

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

d. On Page 12, 4<sup>th</sup> paragraph, Applicant argues the following:

Clawson also teaches the use of an oxygen containing gas (Clawson, abstract) and a result, catalyst 28 is supported within the partial oxidation zone 24 (Clawson, column 4, line 10). The use of oxygen in the feed stream to the reaction chamber and hydrogen generation via partial oxidation or autothermal reforming is not described or claimed in the present application.

Examiner respectfully disagrees. The claims use "comprising" which is open transitional language and does not exclude a reference from having more elements than those recited in the instant claims. MPEP 2111.03 [R-3].

e. On Page 12, 5<sup>th</sup> paragraph, Applicant argues the following:

Furthermore, Clawson does not teach a staged configuration wherein the stages are located in a single reaction chamber. Clawson's reformer vessel contains a plurality of reformer vessels (Clawson, column 3, lines 44-57). Catalyst 28 is located in the first vessel 18 (Clawson, Figure 1). It should be noted that Clawson's catalyst 66 and 84 are located in a high temperature shift zone and a low temperature shift zone respectively and are physically removed from the first vessel 18 and catalyst 28.

Examiner respectfully disagrees and points out that the reaction stages (28, 66, 84) of Clawson are positioned in a hydrogen reactor chamber (Fig. 1, 12), as instantly claimed.

- f. On Page 13, 4<sup>th</sup> paragraph, Applicant argues the following:

Clawson does not specify nickel as a candidate. While nickel may be considered a transition metal, one having ordinary skill in the art could not have been expected to readily separate nickel from among the laundry list of over 60+ elements that are within the broad group of "transition metals." This is particularly true where Clawson calls out particular metal oxides and omits nickel with respect to its high temperature shift catalyst 66. In contrast, Clawson does recite nickel with respect to its steam reforming catalyst 28, further emphasizing the distinction between catalysts for steam reforming and catalysts for water-gas shift reactions.  
Because Clawson fails to teach or suggest a high-activity steam reformation catalyst of a supported nickel-based catalyst, it is respectfully submitted that Clawson fails to teach each and every element of claim 13.

Examiner respectfully disagrees. Clawson does teach a high-activity steam reformation catalyst of a supported nickel-based/(transition-metal based) catalyst. Though Clawson states "transition-metal" and does not specifically state "nickel" (col. 4, lines 43-58), and though Clawson names a few examples of transition metal oxides which do not include nickel; one skilled in the art would have recognized that "nickel" is also an option because it is a transition metal as well and because examples of metal oxides named are not exclusive of other transition metal oxides such as nickel. Moreover, one skilled in the art reading Clawson would have considered the use of nickel in the high-activity steam reformation catalyst since Clawson discloses using nickel for the steam reforming catalyst (28).

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAITY V. HANDAL whose telephone number is (571)272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neckel Alexa can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. V. H./  
Examiner, Art Unit 1795

9/20/10

/Alexa D. Neckel/  
Supervisory Patent Examiner, Art Unit 1795